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FOREST SERVICE

REPORT ON MADISON INSECT CONTROL PROJECT

1931

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INTRODUCTION:

The 1931 Madison insect control job became history, as far as the actual control work was concerned, on June 30, 1931.

In writing the report on this project I have tried to relate all of the important facts concerning the project, from its first inception to the end of the work this year. The report contains the stated objectives of the project, its history, and a tabular and general summary of the work. Since it is expected that the project will continue over a period of years, it is the aim of this report to give not only a picture of the 1931 work, but also to set out in some detail a number of suggestions for future work which are based on the experience gained this year. Errors which we made will be brought out, in order that those who may follow up this year's work in the continuance of the project may profit by our mistakes so far as possible. It is felt that the largest value of this report lies in the assistance it may render in the future of the project. The form of insect control carried out on the Madison this year is new in the Region, and the type of country infested was a new type of "bug country" in Region 1. We received much valuable assistance from the personnel of Region 4, particularly from Assistant Regional Forester C. B. Morse, and from the memorandum submitted by Supervisor F. S. Moore of the Caribou, concerning their work in the fall of 1930, as well as from the Bureau of Entomology. More mention of this co-operation is made later. In spite of all the assistance we received there were still many problems to be worked out on the ground, and it is our belief that the solution of these problems this year should lead to better results and lower costs in the future.

HISTORY OF THE PROJECT:

The possibility of a control job on the Madison Forest has been known in Region I for a number of years. Ever since the Big Hole Control Project failed to check the spread of the infestation to the south and east it was felt to be almost a certainty that the beetles would spread to the Madison Forest, and work would have to be resumed here. Forest officers and members of the Bureau

of Entomology kept a close check on the situation until, in the early fall of 1930, they found evidence of conditions approaching the epidemic stage in a number of areas in and adjacent to the Forest. A general check-up showed the centers of infestation to be located in the Tobacco Root Mountains, the Ruby drainage, the Upper West Fork of the Madison, the Blacktail drainage, and the Sheep Canyon drainage in the Blacktail Hills. This latter unit lies entirely outside the boundaries of the Forest and it was not known to be the center of an infestation until a check-up was made, last fall, although there is evidence of several years' infestation here.

Survey: Beginning about October 1, 1931, a general survey was made of known and suspected areas of infestation, including those enumerated. Messrs. Gibson and Rust of the Bureau of Entomology made the survey in Sheep Creek and the Blacktail Creek country. The remainder of the area within the Forest was handled by two survey crews, one composed of J. F. Jost and Ranger B. A. Bealey, and the second consisting of Ranger R. J. Smith and Finn Frost. District Rangers Joy, Schwan, Edwards, and Fry all spent some time on the actual survey. Terrell and DeLeon of the Bureau of Entomology made the survey in the Basin District.

The general method of survey was the use of strips, run by compass and pacing, and a tally of all old and new attacks on the strip, which was 1 chain wide. The areas of timber, both susceptible and other type, were mapped and checked with a grazing map which is known to be reasonably accurate. These strips were not planned with the idea of running them into known infestation, but an attempt was made to have them show a true cross section of the area covered with respect to the number of infested trees per acre.

As stated in Assistant Supervisor Carroll's letter of November 12, to Mr. J. C. Evenden, check strips were run both so as to come very close to groups of red tops and also to avoid these groups as far as possible. The result showed the original estimates on part of the Ruby District as being too high, as Mr. Carroll had thought. The lower estimate was used, and the final figures were based on the average number of trees per acre, as shown by the strips, figured against the total acreage of susceptible timber; namely, the mature lodgepole pine and white bark pine types. The total estimate based on the survey showed approximately 26,400 infested trees within the Forest and in the adjacent areas mentioned before. The results of the sur-

vey are shown in Mr. Evenden's report.

The survey brought out several points of interest:

First: That there was apparently a serious situation existing in the Sheep Canyon Unit. The heaviest infestation was concentrated here, with a total of approximately 12,000 trees. This area is situated so as to form a serious menace to the Forest since it is only a matter of 10-15 miles away from the Forest boundary. Conditions within the area are such that a build-up could occur and spread to the Forest very easily.

Second: The infestation in the Ruby Valley was not a real epidemic, but varied from so-called "normal" to endemic proportions. It indicated a situation that had possibilities of a build-up and that needed attention.

Third: On the West Fork of the Madison and its tributaries there was evidence of several infestations developing in areas favorable for a build-up.

Policy Set Up: Mr. Evenden estimated that it would require at least $52,000 to clean up all the trees indicated by the 1930 survey, of which $23,000 was for treatment of 11,600 trees in the Blacktail Hills, the area of private land and public domain outside the Forest, located chiefly in the Sheep Canyon region. Another $17,000 would be required for the 8,761 trees estimated to make up the total of scattered infestations in the Ruby District. In Mr. Evenden's report the Blacktail Hills were considered in the Ruby Unit. The estimated cost of control for this unit was placed at $40,000.

The Wall Creek Unit, which included the West Fork of the Madison from Meridian Creek up, was estimated to contain 2,737 trees and was estimated at $5,600 for control. The Tobacco Roots in the Sheridan District were estimated to contain 3,294 trees, with a concentration of 2,000 trees in Bell Canyon, and the remaining 1,300 divided among nine other drainages.

Mr. Evenden's recommendations were strongly in favor of a 100% clean-up, provided the necessary funds could be obtained. Obviously a 100% clean-up was desirable, not only from the standpoint of early control of the infestation which seemed to be developing on

the Madison, but also to enable the determination of whether the infestation was a local build-up, or whether it was the result of flights of bettles from the large infestation surrounding the Madison.

In the event that sufficient funds could not be obtained for a complete clean-up, Mr. Evenden urged a clean-up of the Ruby Unit, and the Wall Creek Unit, omitting the Sheridan Unit as being the least dangerous of the three. In case a further reduction were necessary the Wall Creek Unit could be dropped, but Mr. Evenden classed this as very dangerous practice.

A total of $45,700 was considered to be the minimum for which 100% control could be accomplished in the Ruby and Wall Creek Units.

In the final analysis of the situation by the Forest Service and the Bureau of Entomology a control project was set up for the two last mentioned units, with an estimated total of about 23,000 trees to be treated. The sum of $30,000 was allotted to the project.

Standing burning, by the use of fuel oil shot on the trees with hand spray pumps had been tried out in Region 4, and found to be an economical and generally successful method of treatment. The method had known limitations, namely, the difficulty of getting oil up to the necessary height on tall trees, as well as the difficulty of burning during windy or damp weather. However, much lower costs per tree had been obtained by this method, under favorable conditions, than by any other method tried in lodgepole control work. It was therefore decided to use the oil burning method on this project, supplemented by the felling and burning method where necessary.

The Madison infestation, as has been stated, is different from any infestation with which this Region has had to deal. Two classes of timber are attacked, the mature lodgepole type, and the white bark and limber pine. All three of these species occur in practically pure stands, and also in mixture with each other and with Douglas fir. Many north and east exposures support a mixed stand of lodgepole pine, white fir, spruce, Douglas fir, and either white bark or limber pine. Beetles were found in all these types. The original plan of operation called for a complete clean-up of all types, wherever the survey indicated that they contained beetles. It was later necessary to modify this plan.

PREPARATION AND ORGANIZATION:

Early in the winter, Assistant Supervisor F. T. Carroll, who had been given charge of the control job, began preparations for the work, in conjunction with the Regional Office. An organization of six camps was planned, three large camps containing twenty-two men each, and three small camps of about eight men each. The larger camps were planned to carry three treating crews of five men each (including foreman and packer), a spotting crew of five men (including chief spotter), cook and flunkey, with the camp manager in addition. The small camps were to consist of a combination spotting and treating crew of five men, with a packer, cook, camp manager and chief spotter, or a camp manager and chief spotter combined, according to conditions on the ground. Each camp was to be in charge of a Forest officer, with men of known ability in charge of treating and spotting crews. Insofar as possible men with insect control experience were to be placed in these positions. Mr. Carroll had prepared a map showing the location of infested areas, prospective camp locations and routes of travel. During late February and early March the overhead organization was lined up. Ten Forest officers were assigned to the job. I was assigned to assist Carroll in handling the project; eight men were lined up to take charge of camps, treating crews, or spotting crews, according to the needs of the project and the experience and ability of the man concerned. One man was to take charge of the supply warehouse in Dillon.

Dillon was chosen as the logical headquarters for the project since it was more centrally located with respect to the areas to be worked than Sheridan.

Five men were lined up to act as chief spotters. These men were all seniors or graduates of the University of Montana. Two of them had previous experience on insect control. The other three were experienced in compass work and mapping, though short on insect control experience. Several crew foremen were lined up at this time.

It was the plan to hold a training camp first, where all of the Forest officers, including Rangers Joy, Fry, and Schwan of the Madison Forest, the chief spotters and crew foremen, would be assembled for a week of intensive training in all phases of insect control work.

Since it was not certain how successful the standing burning would be under conditions existing on this project, Mr. Carroll had several other methods in mind as alternative measures to use in case of necessity. It was the plan to try these methods out and familiarize the men who were to have charge of the work on the ground with them. In short, this camp was designed to be a training camp and proving ground for methods and equipment at the same time. At the break up of this camp, it was planned to push out the other camps as rapidly as conditions would permit until all six camps were out.

The general layout of camps provided for the training camp in the Blacktail Hills in Section 35, T. 9 S., R. 9 W. The Blacktail Hills country opened up before the higher country on Blacktail Creek and areas within the Forest opened up. This part of the project was to be cleaned up first, swinging up the Blacktail, thence into the head of the Ruby and West Fork of the Madison, and finally concentrating the forces on a cleanup of the lower Ruby. It was the original intention to camp mainly on the ridges and follow these through in moving the camps, since in general the open ridge tops offer as good or better going than the stream beds, and the bulk of the susceptible timber is located on the upper slopes and on the ridges. This plan was of necessity modified somewhat, as will be seen.

Equipment: Early in March the equipment necessary for the organization planned on was ordered and shipped to Dillon. An extra 22-man camp unit was ordered, with the idea of moving it out ahead of the other camps and setting it up to avoid loss of time in moving camps. Equipment was provided for three methods of treatment. A skidding outfit such as was used in the Big Hole, two complete burning outfits for each treating crew, with an extra outfit in each camp, and a number of hand timber carriers for use in "hand logging" trees with decks, were provided in each camp outfit. This made the equipment quite bulky, but it was considered to be a wise policy to provide for these other methods of treating should the oil burning prove unsatisfactory.

Mess equipment for the large camps consisted of a 25-man fire outfit, and for the small camps a 10-man fire outfit. These outfits were supplemented by the addition of extra dish-ups, a few large kettles, water buckets, etc. The 25-man mess outfit as used on the Coeur d'Alene in 1929 was the basis for our list.

Beds consisted of a standard "improvement bed" containing six thicknesses of blankets and a tarp., a folding canvas cot and cot mattress. This is a bulky outfit but it is necessary to provide comfortable sleeping accommodations for men at this time of year. The cots more than paid for themselves in time of setting up camps. They are a worthwhile piece of equipment. The number of blankets proved inadequate during the blizzardy weather prevailing in April and the first part of May. Fortunately we had extra beds during this time and extra blankets were issued. These were taken up during the latter part of the job and the beds returned to standard size.

For packing oil, five-gallon cans fitted with upressit lids and pull-out spouts were used. These gave very satisfactory service. They are strongly made, do not leak around the lid, and are handy for pouring the oil into the pumps. Four cans were packed on each horse. For the most part they were packed in special boxes made up to hold two cans in a separate compartment for each, a box being swung on each side of the horse. The boxes were made up in the Missoula warehouse according to specifications furnished by Region Four. We changed these specifications slightly by having the ends and middle of the boxes strapped with a metal strip, and using a cleat on the ends of the boxes instead of the hand holds cut into the end pieces as called for by Region Four's specifications. The result was a much stronger box. The boxes proved to be a very satisfactory packing arrangement. They afford good protection for the cans, make the oil packing a very simple job, and are reasonably durable. On gentle stock they should average two seasons' service. We also tried alforjas for the oil packing. These are satisfactory. They are a little easier to pack and unpack than the boxes, since the load can be swung a little lower. The alforjas are less apt to be damaged by bumping trees than the boxes, but they do not afford the same protection to the cans. Taking everything into consideration there is not much to be said in favor of one over the other.

Hiring Men: The labor for the job was obtained in Dillon and Sheridan, except for a few men who were chosen for special jobs such as crew foremen, chief spotters, etc. Due to the depressed economic condition of the country there was a surplus of men available. Insofar as possible local men were used, and preference was given to men with families. The insect control office was opened in Dillon on March 26. At

that time Mr. Carroll had a list of over a hundred names and the office was crowded daily by local men and men who had come in from outside on hearing of the job. The job was originally planned to start about April 1, but was delayed by bad weather until it was April 6 before we started and nearly June 1 before we made any material increase in the size of the crews. In the meantime we could have filled our camps with men who were willing to work for their board had we so desired.

The wage scale maintained for the job was $2.80 per day plus board for common labor, $4.00 per day plus board for crew foremen and chief spotters, $90 to $110 per month plus board for cooks, $90.00 and board for main line packers. Oil packers were paid the regular wage for common labor. The general quality of the men employed was good. There were enough "lumber jacks" among them to supply all of the axe men and sawyers needed. The remainder were well enough suited for the class of work they were called on to do. Very little turnover was experienced on the job.

Transportation: Since this project was scattered over a very large area, and the country involved was relatively rough, with few roads, of poor quality, transportation offered quite a problem. Seven of the camps required pack transportation; the remainder could be reached by wagon or by truck. A number of the camps which could later have been reached by wagon or truck required pack transportation due to the impassable condition of the roads at the time we wanted to use them. The transportation system was organized with two short mule strings, consisting of six mules, a bell mare and saddle horse each, obtained from the Remount Station, a four-horse wagon outfit, hired by the month, and a 1½ ton truck. We supplemented these with two Ford "pick ups", which Carroll and I used for our travel and the use of hired equipment as the need arose.

Warehouse: Some difficulty was had in obtaining a proper warehouse in Dillon. The first plan was to obtain a warehouse suitable for the combined needs of the Beaverhead Forest and the insect control. There are a good many warehouses in Dillon which would be suitable but the owners have very exaggerated ideas as to their rental value. After looking over all the possibilities, temporary quarters were selected in a part of the Dillon Implement Company's store. This place furnished good quarters for the insect control project but was not suitable for a general Forest Service warehouse, since we could not obtain enough space for both the Forest and the insect control equipment at a price

within reason. It was necessary for the insect control project to stand the entire cost of the warehouse, whereas this cost would have been divided between the Forest and the project had it been possible to obtain a place suitable for both. Ranger C. A. Butler was placed in charge of the warehouse, which functioned as a central distributing point for all supplies and equipment used on the job.

Office: A separate office for the project was maintained in Dillon in a room furnished by the Beaverhead. The volume of work connected with a project of this size is too great for the regular clerical force of a Forest to assume in addition to their own work, hence a project clerk Mr. A. E. Hoell was assigned to the job to handle the clerical end of it. Mr. Norman Henry, Executive Assistant on the Beaverhead, gave Hoell much valuable assistance in handling his vouchers and accounts. This is work with which Hoell, who is second clerk on the Gallatin, was not very familiar. Miss Pershina, Principal Clerk on the Madison, made several trips to Dillon and checked over the project books and records.

Start of Work: In future projects of this kind, it is highly desirable that a person well qualified for the work be assigned. The actual work was started on April 7 when the training camp was established on the Sprinkle ranch in Sheep Canyon. This camp-site was really the third choice. The first one chosen was abandoned at the start of our preparations on the ground when a heavy snowfall rendered it out of the question to break through to the upper country. This snowfall occurred between the time that Mr. Carroll was in Missoula in February and March 26. The second choice, a site located in Section 25, T. 9 S., R. 9 W., about two and one-half miles above Sprinkle's, was abandoned when an attempt to break through with a four-horse team and wagon failed and it became apparent that the cost of pushing a camp in would be too great to warrant it, particularly when snow conditions were such that work would have been very difficult once we were in. Our training camp was, therefore, in a poor location, but the best obtainable. It was on the fringe of the Blacktail Hills infestation. For a time it looked as though we would have to import a few "bug trees" to train with. We finally located a total of 100 trees and these were treated, using various methods. The men lined up as chief spotters were broken in by Mr. A. L. Gibson, the entomologist assigned to the project. Mr. Evenden assisted in all phases of the training, and the work was so arranged that all the men in the camp received instruction and experience on both spotting and treating. Treating was handicapped by the fact that our burning equipment, which

had been ordered in ample time, was delayed in shipment. A makeshift burner was rigged out of a Hauck torch. This served to demonstrate the principles involved in the oil-burning method. In fact the Hauck makes a very good burner, except that it is too limited in oil capacity. The heating coil was removed and the jet replaced in a fitting on the end of the hose. Our first burning equipment arrived on April 9, and after this it was possible to give the men instruction in its use.

On April 9 our two pack strings arrived. They proved to be unbroke stock except for two broke mules in each string. By April 13 we had them in shape to work, and moved camp to the Rye Patch in Sec. 25, T. 9 S., R. 9 W.

By this time it was apparent that any attempt to spread out and put in more camps would be useless. We were working the lowest country which we had and were bucking snow which ranged up to three feet in depth. Undoubtedly we could have broken through and placed camps in the higher country but could have accomplished nothing after we got there. Accordingly it was decided to sit tight with our organization as it was.

Junior Forester N. B. Fullerton had been placed in charge of the training camp as camp manager. He was continued in charge of the second camp. The other Forest officers were assigned various jobs as spotters, crew foremen, oil packers, etc. The chief spotters were organized into a spotting crew under the direction of Gibson, and the work of cleaning out the main branch of Sheep Canyon progressed. It was slow hard work, and our "high priced" crew undoubtedly raised the costs somewhat. On the other hand the men worked with an enthusiasm and steadfastness of purpose that could not be equalled by any crew of temporary men. To give an idea of the contrasting conditions prevailing, on certain exposed slopes it was necessary to fight hard to keep the fires in bounds, while within a few hundred yards there were drifts covering a half section or more where travel with horses was almost impossible.

By the 20th our small supply of oil had run out. We had sent out bids to all of the oil companies represented in the Butte territory and east to Billings, but received only one bid. The sample submitted with this bid was unsatisfactory, since it contained a high percentage of asphalt. We had not anticipated any trouble in obtaining the oil from one of the larger companies. Carroll and I had made a trip to Butte on April 13 and 14 and interviewed representatives of every company in town, but could

find no one who knew anything about the oil we desired, from the specifications we had. We brought back a sample of oil from the Russell oil refinery, but this proved to have too low a flash point and too little lasting qualities. We again fell back on our friends in Region Four, and Assistant Regional Forester C. B. Morse obtained a carload of oil such as they are using, from the Continental Oil Company, for us. This oil proved to be entirely satisfactory.

In the meantime on April 21 a blizzard had descended on the country. It lasted from noon of the 21st to noon of the 22nd and left from eight inches to a foot of new snow piled in drifts on top of the old ones. Our new oil arrived on the 23rd, but we were unable to do any work for three days after the storm. The trees were covered with snow and both spotting and treating were impossible.

On the 26th Messrs. Koch, Carter, and Evenden arrived to inspect the work. By this time it was apparent that the estimated number of infested trees in the Blacktail Hills was too high. It was also apparent that the cost of treating the high Alpine types, consisting largely of whitebark and limber pine and the mixed types would be higher than the results obtained warranted. Mr. Carter held to the position that even though beetles did exist in areas of whitebark and limber pine at the higher elevations, the natural conditions in such types were against a build-up of the infestation. This point was agreed on, and it was also agreed that beetles existing in a mixed type were not much of a menace. Mr. Evenden stated that from an entomological viewpoint a 100% clean up of all infested trees would be desirable. This would tend to prove or disprove the flight theory, but that from the standpoint of controlling the infestation it was not necessary or feasible to treat the scattered trees found in mixed types and in the high Alpine types.

The policy set up for the remainder of the project included the treating of all infested trees in areas of susceptible timber types and the elimination of the areas discussed above. Had this policy been in effect at the start of the project very little of the area worked out of the training camp would have been covered. The new policy left the entire east slope of the Blacktail Hills, facing Blacktail Creek, in the doubtful class. There were known to be a few areas of susceptible timber in Ashbough, Jakes, and Price Canyons. These were thoroughly scouted by Carroll, Gibson, and myself and only two newly attacked trees were found, with very few old attacks. The result was the elimination of these areas from the control plan.

On May 3 a camp was set in on the right hand branch of Sheep Creek at Talent's ranch. Ranger S. M. Lukens

was placed in charge and Ranger Howard Larsen was sent in to assist him. The spotting crew was moved to this camp, since they had cleaned up the area workable from the other camp. The first week at this camp was spent in spotting. All the area to be worked was spotted first, since burning conditions were generally poor.

On May 5 Fullerton moved to the camp in Section 2, T. 10 S., R. 9 W. There was still from 1 to 3 feet of snow in the timber which was to be worked from this camp, but it was settling fast. Fullerton set up camp and spotted two days. He then organized a spotting and treating crew, later turning the spotting crew into a combination spotting and treating crew to clean up isolated areas after the main bodies of susceptible timber had been spotted. This latter method proved very effective in the clean-up of such areas.

On May 19, Ranger J. H. Watson was moved to the head of the Blacktail to set up camp, and team and pack headquarters there with three men. Another wet spell set in and it was not until May 23 that the camp was up and ready for occupancy.

Fullerton moved to the head of Sheep Creek at Howarth's cabin on May 22 and camped in Section 18, T. 10 S., R. 8 W. He completed the Sheep Creek area from this camp, using one of the pickups to get the area near Flynn's cow camp in Sections 13 and 14 of the same township.

On May 9, Lukens had been called to Missoula to fill in a vacancy on the Lolo. Larsen was put in his place and Leavitt assigned to help him. Larsen finished the area out of this camp and was moved to the West Fork of the Blacktail in Section 21, T. 12 S., R. 6 W. on May 25 and 26.

Fullerton finished the Sheep Canyon Unit on June 2 and was moved to the West Fork of the Madison, camping at the mouth of Meridian Creek in Section 17, T. 12 S., R. 1 E. Jost was moved in at the same time and camped on Lobo Creek in Section 18, T. 12 S., R. 1 W.

Larsen and Watson were finding very few "bugs" on Blacktail. Both changed from the use of advance spotting, followed by treating, to combination treating and spotting, since the few trees found did not justify both operations. Gibson was on the area with Morris assigned to help him. They scouted ahead as fast as possible, eliminating areas of nonsusceptible timber. Larsen and Leavitt scouted the Upper Blacktail and did likewise. Gibson found a large group of 179 trees in the head of Basin Creek, which was treated in one day by Watson's crew. This was the only group of any consequence that Watson had.

Mr. Koch inspected the work again from June 7 to 13. On the 8th Mr. Koch, Carroll, and I went over a large part of Larsen's area with him. Watson moved to the East Fork of Blacktail. After viewing the situation on Blacktail Creek, Mr. Koch decided that it was not worth while to treat such areas at all. There was decidedly no infestation present here, the average number of trees running about one tree to fourteen acres. The decision reached was that we should not treat areas which contained less than one attack to five acres. The estimates were so decidedly high that a program of advance survey was planned before any further camps were placed. Watson was instructed to strip his country and eliminate all areas which did not contain the minimum number of trees as decided on.

On the 9th Mr. Koch and I went in to Jost's camp on Lobo. Jost was finding fewer trees than were estimated although he had found larger sized groups, than were showing up in Blacktail. He had scouted the head of Cascade Creek and reported nothing worth working there. There was a group of about 100 trees in the Cascade Basin, and on a scouting trip the next day Jost and I found another 100 trees in a group between Cascade and Crazy Creeks. Leavitt scouted the upper West Fork of the Madison and found nothing to work. Leavitt was placed in charge of this camp to clean up all trees found, and Jost was placed in charge of the advance survey crew.

On this work Jost covered all of the Ruby drainage again, with four men in his crew. All of the susceptible timber type was stripped, following the same general method as on the original survey except that the work was more intensively done. This survey eliminated all of the Ruby except Idaho Creek, Dark Hollow in Greenhorn Creek, and a small area on Warm Springs Creek.

Bloom was given a crew on June 11 and sent in to clean up Idaho Creek and Dark Hollow. He finished on the 22nd and moved out on the 23rd. His was the last camp to finish. Watson had completed his area on June 21, and Larsen on June 23. After our conference with Mr. Koch early in June Larsen scouted Clover Creek, the head of the Wolverines, and the head of West Creek. He found 660 trees in these drainages in a comparatively small total area of timber. The attacks were concentrated in groups. Cleaning these areas from his camp required a long hike each way, but it was cheaper than a move would have been.

Fullerton finished on Meridian Creek on June 16 and his camp was broken up. The Meridian Creek area was estimated at 169 trees, in one large group. This was one place that the estimate was low, 280 trees being found. The attack in this area was apparently concentrated on the one ridge. Scouting failed to reveal other groups.

Leavitt completed Lobo and Cascade Creeks on the 17th. His camp was broken up and the crew sent in to help Larsen finish up.

At the close of the job all equipment was assembled in Dillon, checked, and prepared for storage. Borrowed equipment, including beds and mess outfits, was returned to Missoula, together with the surplus food supplies. The remaining equipment was moved to Sheridan and stored there since no suitable storage place could be found in Dillon.

A second carload of oil was obtained about June 1. Very little of this car was used due to the decrease in number of trees over the expected amount. The oil is stored at the Continental wholesale warehouse in Dillon, as are the empty barrels. This oil will be available for use next year should there be a project.

I have not gone into any detail as to the number of trees treated in each camp and their location, since this information can best be obtained from the tabulated summary and the maps accompanying this report.

There follows a brief summary of the conditions which we found, and a discussion of the errors which were made this year, with some recommendations for future work which it is hoped will prove of value in the future conduct of the project.

SUMMARY AND RECOMMENDATIONS:

We found real infestations on this project in the Blacktail Hills, on the West Fork of the Madison, on Clover Creek, the Wolverines, and West Creek. It is true that the estimate was about three times too large in the Blacktail Hills, but the attacks were grouped in the susceptible timber and build-up conditions were present. There were fewer 1930 attacks than there were 1929. Whether this decrease would have continued we will never know. We messed up the picture. This is one of the uncertainties of insect control work. We cannot afford to take a chance and see what nature will do.

In the West Fork of the Madison the estimate was three or four times too high, but epidemic conditions prevailed over a portion of the area, and there is a fair build up chance. This is particularly true on Meridian Creek, where the largest concentration on the project was found--280 trees practically in one group. There was other susceptible timber within easy reach of these beetles, and I believe that these trees constituted one of the most serious menaces of the whole infestation, situated as they were in the extreme eastern end of the area and adjacent to the large areas of lodgepole in the Basin Ranger District.

There was no real epidemic on the Blacktail drainage proper. The major portion of this area did not warrant the work that was done there, but we could not do otherwise in the face of the estimate for the drainage.

Epidemic conditions in the Ruby drainage were confined to a very few areas, as has been brought out in the foregoing discussion. I feel sure that we located and treated every area which contained even a mild epidemic and that we eliminated a large territory from further control work unless there are flights of beetles coming into this country.

Our work in these lightly infested areas was not a total loss, since it served to locate the present centers of the infestation very definitely. However, surveying with treating crews is an expensive method. More money spent on the fall survey will be more than justified in saving of money and better results the following spring. The working season in this country is short enough at best. False moves such as we made in Blacktail Creek this year are not only costly, but could very easily prove disastrous to the success of a year's work should an unexpected number of attacks show up elsewhere during the work. Fortunately for the clean-up, the entire estimate was high this year. A certain amount of spring scouting ahead of the treating will always be necessary in handling these projects, but it is impossible to plan intelligently such a project unless dependable surveys are made during the preceding fall. Such work must be considered as much a part of the project as the actual control work. It cannot be satisfactorily accomplished by the regular ranger force unless they can be relieved of their other duties for the time necessary to accomplish the desired results. Although the decision as to how the work will be accomplished is an administrative matter, it is felt that the projecting of the survey work would prove most satisfactory from all angles. The rangers can, and no doubt will be of considerable assistance in the location of areas to be eliminated and those to be surveyed intensively. They can observe and record the location of new attacks and old attacks which are likely to form the center of new ones during the course of their regular work. In the survey work itself it is felt that at least a 5% survey of all susceptible timber where beetles are known or suspected to exist should be made. No dependence should be placed in a "red top" survey. Porcupine work is as prevalent as beetle work in this region. From a distance it is impossible to tell the two apart, and estimates based on "red tops" observed are certain to be misleading.

In planning the work for another year it is felt that no attempt should be made to begin the actual control work until May 1. It must be kept in mind that the country to be worked is all above 6,000 feet elevation and that

the major portion of it lies between 7,500 and 8,500 feet elevation. Portions run up nearly to 10,000 feet. The work this year was planned on the basis of a small fairly compact organization, moving progressively over the area for as long a period as possible. Such an organization would be ideal if conditions permitted. Under conditions existing it will be necessary to plan for a larger more widely scattered organization for a shorter period. Such an organization is difficult to handle, requires more transportation, and more travel time for those in charge of the project, and more overhead expense in cooks' wages, etc. The difficulties of transportation and travel must be planned for and overcome and the increased overhead cost considered a necessary part of the project. It will be cheaper in the end than to stand the lost time due to impossible working conditions such as we encountered this year in April and early May. The time of starting the project cannot be definitely determined in advance, of course, but must be determined each year by the man in charge of the project after a careful investigation of the conditions on the ground. The work should be planned to follow the snow back as nearly as possible. Under this system of burning the fire hazard is much greater than under the system of skidding and burning in decks. In ordinary seasons it may be possible to burn as late as July 15 to 20. Burning after that date is attended by a very great fire hazard and a greatly increased cost. Whenever conditions are dry enough for fire to run in the duff it is necessary to assign an extra man to each crew for firefighting purposes. Unless extreme care is used in putting out all fires after the burning, hangovers will result, which can easily result disastrously after the crew has left the area. Four such hangovers resulted from this years work. Two of these were caught and extinguished in their incipiency, one while the crew was on the area and the other shortly after they left. The other two held over for nearly three weeks and resulted in two fires of two and three acres each. Fortunately a local man had been assigned to watch the area as an added precaution and the fires were caught before any great damage had been done. Under the skidding system it was possible to confine the fire to well chosen areas, trench each pile, and burn at night. Under the standing burning system the fires are widely scattered and often in hazardous places. Burning at night is not feasible due to unfavorable temperature and humidity conditions. It is, therefore, desirable that the work be done as the snow is leaving or as soon afterwards as possible. If work must be done after the ground has dried off, all fire should be completely extinguished before the area is left. Contrary to some opinion, this is not an "asbestos country".

In general our organization of control crews proved satisfactory this year. In areas of real infestation spotting ahead, followed by a separate treating crew, is desirable. The regular five-man spotting crew, consisting of chief spotter and four men, was used and is satisfactory.

In areas of scattered infestation the combination treating and spotting crew proved most effective. Such a crew ordinarily consisted of the five-man spotting crew and in addition the oil packer and a "treater". The latter two worked together on trees found. The number of horses used in the oil string will vary with the average number of trees being found and the distance from the available oil supply, which is usually the camp.

In areas of real infestation it is often possible to utilize the slack time of the regular pack strings to spike out an oil supply in located groups, or near areas containing several large groups. This saves lost motion in waiting for the oil string to bring in oil and raises the crew production considerably. This scheme was used very effectively on the Lamb Creek area by Larsen and in other instances. Ordinarily a saddle horse and two pack horses make the right sized string.

In hiring foremen and chief spotters it is desirable to obtain men who will qualify in either position. On a job of this kind it is often desirable to change a spotting crew into a treating crew for a time. The men best suited for this class of work are men who have had woods experience, can run a compass and pace, and handle a small crew of men. They must be able to understand and follow instructions and assume the responsibility of independent action when necessary. Good hiking ability is a necessary qualification for all the men employed on the work. Long hikes are unavoidable. This year's work has served to develop a number of men who will be valuable in carrying on the work next year in various capacities A list of these men is on file, and undoubtedly a number of them will be available for the work in the future.

In future projects on this Forest, I believe that the smaller camp units should be adhered to. The larger camps are too cumbersome to be suited to infestations of this type. A light mobile unit which can be equipped to be as nearly self-sustaining as possible will prove the most satisfactory. There is a possibility in the use of camp wagons which should not be overlooked. For small crews up to 6 or 8 men, a camp wagon will provide ample kitchen space. A dining tent could be provided if necessary and bunk tents for the crew. In moving, the wagon and oil string would be all the transportation necessary. It is possible to obtain horses suitable for both packing and harness work. A four-horse outfit of this kind should prove the most economical unit for working scattered, small patches of timber, such as the Wolverines Clover Creek, Basin Creek, and The Middle Fork of Blacktail Creek.

Whether camp wagons are used or not, unless very much heavier centers of infestation develop on the various units of this project, the lighter units will prove the most satisfactory for carrying on the work.

Some little discussion of the equipment used is contained in an earlier part of this report. In general the crews were equipped satisfactorily. Region Four's experiance helped us in this respect.

We tried 15-gallon and 30-gallon oil drums as containers for use in spiking out an oil supply. The plan was to set out the empty 30's at the desired place and pack the oil to them in the 15's, two to a horse. This proved unsatisfactory for three reasons. It is hard to obtain 15-gallon drums which will not leak. A space must be allowed for expansion of the oil, and the resultant slopping in the drums makes the pack hard on the horse. The time and wastage involved in transferring the oil three times is too great. It will be better to furnish enough of the 5-gallon cans to fill and set out in the desired places, the empties being brought in daily.

This year we carried equipment for three methods of treating in each camp for reasons stated. Our experience with the standing burning method has proven it to be satisfactory, and undoubtedly the cheapest method that could be used for this type of infestation. It should not be necessary to carry the skidding equipment another year. The timber carriers were of very little value at any time and should be discontinued. It would be well to have one or two skidding outfits available at the central supply point of the project in case they should be needed at some point on the project. The spray pumps used were satisfactory. We received some suggestions from members of the crew that a light bamboo rod be furnished for use as a stiffener for the long extensions. I believe that the suggestion is a good one. The rubber hose obtained this year proved highly satisfactory; not one length was replaced because of failure. It was the general opinion among the burners that about a foot more hose would give them greater freedom in handling the nozzle, especially when long extensions are used. Copies of our 7-man and 22-man equipment lists as put up this year are attached to this report.

The cans of extra parts do not contain enough of the large gaskets for the pump tops. A larger supply of both gasgelite and rubber gaskets should be obtained to supplement the supply in the cans.

In the future conduct of this project it will be necessary for the Beaverhead and Gallatin Forests to cooperate in the matter of keeping a close check up on the possible advance of the infestation. If a man is assigned to the project he will, of course, keep in close contact with the situation on both Forests and the infestations surrounding this one. It is felt that particular attention should be paid to the Tobacco Root Range, since the infestation there has had another year in which to build up, and it can very easily form a source of infestation for portions of the area gone over this year.

A control policy for the Madison infestation has been built up this year, which it is believed will do much toward facilitating the work next year. The two policy changes and the frequent changes in plans necessitated by unforeseen conditions caused a good deal of lost motion in this year's work. Such changes make for confusion in the records and the basic data needed for compiling a true record of the project. It is felt that the policy established this year is sound and adapted to the control of this infestation. Unless there is some very good reason for a change it is felt that the present policy should continue in effect throughout next year's work.

The costs of this project are high when considered on a tree basis. Unless the infestation becomes very much more concentrated, the per-tree costs will always be high. It is hardly fair to the project to compare it in cost on a per-tree basis with other projects having a more concentrated infestation to deal with. An acreage basis seems fairer, because after all there is just so much area to be protected and it will cost just so much an acre to protect it, depending more or less on the average number of trees per acre.

The attached tabulations and maps show the location of treated areas, the acreages covered, and the average number of trees per acre in each unit.

A tabulated cost report which summarizes the costs of the project this year is also attached.

Respectfully submitted Sept 12, 1931

G. M. Dannette
Assistant Forester.

S
Insect-Control
Madison

EQUIPMENT LIST FOR 22-MAN CAMP

14	Axes, D. B. 3½#
9	Bags, nose
9	Bags, water, 1-2 gal.
12	Basins, 4 qt., tin
2	" 2 " "
12	" 1 " "
6	" wash
23	Beds, std. imp.
6	Blankets, saddle
2	Boards, wash
24	Bowls, soup, granite
7	Boxes, for 5-gal. oil cans
1	Broom
1	Brush, scrub
6 Doz.	Candles
18	Cans, 5 gal. Reg. 4 type, round
3	Canthooks, 4' x 2½"
4	Carriers, timber, with chisel points
1	Cinch-packsaddle
2	Collars, pipe, asbestos
22	Cots, canvas
4	Dippers, 1 pt.
20	Elbows, pipe, 6"
2	Flies, 17' x 30'
12	Files, 8" mill
10 Gal.	Gasoline
1	Griddle, oval, flat
1	Grindstone & Fixtures
6	Halters
1	Hammer, claw
4	" single jack
10	Handles, saw x-cut
5#	Haywire
6	Horses, pack, hire locally
3	" saddled, " "
1	Iron, soldering
49	Joints, stovepipe, 6"
1	Kit, first aid, std.
2	Lanterns, Coleman, gas
2	Latigoes
1	Leather, strip, for repairs
2	Mantas
4	Mattocks
22	Mattresses, cot
10#	Nails, 10d
20#	" 20d
10 Gal.	Oil, coal
1	Outfit, cobblers, small
1	" cook, 25-man, box and boiler only.

1	Outfit, sawfiling
1	" , skid (1 skid chain 8' x 5/16" - 2 hooks; 1 skid tongs, light cedar)
1	Outfit, skid (1 horse Secure lo- (1 harness cally (1 single tree
6	Packets, first aid, F. S.
4	Pitchers, water
6	Pads, saddle
2	Pots, 1-2 qt. with covers
2	Pots, coffee, 3 gal.
7	Pots, coffee, 1 gal.
5#	Rope, 3/8"
8#	" 1/2"
1	Rivets, ½# box copper, assorted
1	Sack, mail, canvas, 18" x 30"
1	" meat, light canvas 4' x 5'
6	Saddle, decker, horse
4	Saws, x-cut, 5½'
1	" hand, carpenters
1	Sheath, saw, 5½'
4	Shovels, L.H.R.P.
2	Solder, ½# spools
8	Stones, carb. axe
6	Stoves, Kimmel, firebox only
1	" " complete
1	" cook, small, long
5	Tents, 14' x 16'
2	" 10' x 12'
2	Tops, table, canvas roll, 3' x 16'
1	Torch, blow
2	Tubs, wash, galv.
1	Turner, cake
6	Unguentine, tubes
6	Wedges, falling, 2#

BURNING EQUIPMENT

5	Bags, for packing ext. rods
80'	Hose
20	Lids for cans, U-Pressed
4	Nozzles, extra

EQUIPMENT LIST FOR 22-MAN CAMP (Continued)

BURNING EQUIPMENT

8	Pumps, spray
8	Rods, extension

EXTRA PARTS FOR PUMPS

8	Cocks, shutoff
6	Leathers, pump
2	Plunger assembly, complete
4	Plunger valve assembly
4	Pump, portable oil
10	Screws, brass, for top plate casting
8	Straps, shoulder
5	Units, hose
9	Valves, shutoff, complete
2	" check, complete
40	Washers for extension hose
20	" (large) for top of pump
10	" (rubber) for use in shut-off

SPOTTING EQUIPMENT 22-MAN CAMP
(For 3 crews)

15	Axes, hand with sheath
3	Books, scale, small-1,000 logs or 100-Insect Control Spotter's daily record--Form E
12	Canteens, 1 qt.
3	Cases, canvas carrying
3	Compasses, F.S. std. & case
3 Boxes	Crayons, lumber, soft, black
3 Pads	Form 878 (Map Sheets)
3	Holders, aluminum, 8½" x 11"
3 Doz.	Paper, carbon, pencil, letter size
3 "	Pencils, 4 H. and erasers
6	" blue
6	" green
6	" red
6	" yellow
1	Protractor, small
3	Registers, tally
25	Report, Spotter's Weekly Report
1	Rule, 6" boxwood
3	Staffs, Jacob
20#	Tacks, bill posters
2,000	Tags, Spotter's, sign painters cloth.

S
Insect-Control
Madison

EQUIPMENT LIST FOR 7-MAN CREWS

5		Axes, D.B. 3½#
2		Bags, water, 1-2 gal.
6		Basins, 4 qt. granite
2		" 2 " "
3		" wash
8		Beds, std. imp.
1		Board, wash
12		Bowls, soup, granite
1		Broom
1		Brush, scrub
3	Doz.	Candles
1		Canthook 4' x 2½"
2		Collars, pipe, asbestos
8		Cots, canvas
2		Dippers, 1 pt.
12		Elbows, pipe, 6"
6		Files, 8"
6		Files, 10"
10	Gal.	Gasoline
1		Griddle, oval, flat
1		Grindstone & Fixtures (Army type)
1		Hammer, claw
1		" single jack
6		Handles, saw x-cut
2#		Haywire
1		Knife, butcher
1		Kit, first aid, std.
2		Lanterns, Coleman, gas
2		Mattocks
8		Mattresses, cot
5#		Nails, 10d
10#		Nails, 20d
1		Outfit, cobblers, small
1		" cooking, 10-man nested
1		" sawfiling
1		" spotting crew
2		Packets, first aid, F.S.
2		Pans, drip, to fit Kimmel stove
2		Pans, dish
28		Pipe, stove, 6"
1		Pitcher, water, granite
1		Pot, coffee, 2 gal.
3		Pots, coffee, 1 gal.
1		Sack, mail, canvas, 18" x 30"
1		" meat, light" 4' x 5'
2		Saws, x-cut 5½'
1		" carpenters' hand

EQUIPMENT LIST FOR 7-MAN CREWS (Continued)

1	Saw, meat
2	Shovels, L. H. R. P.
3	Stones, axe, carb.
3	Stoves, Kimmel, firebox only
1	" " complete
2	Tents, 14 x 16
1	" 12 x 14
1	" 10 x 12
1	Top, table, canvas, 3'x6'
1	" " " 3'x16'
1	Tub, wash
1	Timber carrier with chisel points
1	Turner, cake
2	Unguentine, tubes
2	Wedges, falling, 2#
1	Outfit, skid, see 22-man list
1	Outfit, comb-spotting and treating
1	Outfit, camp manager's
1	Saddle horse & saddle, hire locally
2	Horses, pack, hire locally
2	Pumps spray
6	Rods, extension
2 Sets	Extra parts (See 22-man list)

COST REPORT

INSECT CONTROL PROJECT

Madison NATIONAL FOREST Date 8/5/31

Project Madison Insect Control 1931

Period of work March 23, 1931 -- June 30, 1931

Acres spotted 25,830 Acres treated 16,234

Acres scouted and advance survey 23,925

Number trees spotted 5,920 Number trees treated 5,870

1. Total Expenditure by Appropriations

a.	Insect control appropriation	21,641.62
b.	Other funds	1,335.35
c.	Total	22,976.97

2. Classified Expenditures

a.	Salaries	4,798.58
b.	Wages. Temporary labor	5,202.39
c.	Travel and transportation	3,691.57
d.	Subsistence supplies	4,431.17+
e.	Other supplies and equipment	3,338.42
e.1	Rent T. & T. & P.	179.49
f.	Contributed time (salaries)	1,335.35
g.	Total (should agree with (1))	22,976.97

Above includes $1,039.81 Subsistence supplies unused, which will be available for 1932 project.

3. Activity Costs

		Subs.	Total	Per Tree
a.	Supervision	------	4,307.48	.74
b.	Travel	------	1,945.90	.33
c.	Transportation	------	3,226.42	.55
d.	Equipment	------	2,939.13	.50
e.	Camps	------	1,574.73	.27
f.	Spotting	------	2,677.64	.45
g.	Treating	------	°4,997.91	.85
h.	Total	------	21,669.21	3.69+
		3,391.36		

i. Subsistence (Prorated to above) -- 3391.36
Per man-day 1.18
°Includes (cost of oil including freight) (572.22)

Instructions for Activity Costs

Subsistence is not given as a separate activity cost, but mess costs, including food supplies and cook-house labor, but not transportation, will be prorated against labor and salaries on the basis of number of days on each activity. Non-effective time of men paid by the month, such as Sundays, Saturday half-holidays, rainy days, etc., will not be carried as a separate item, but the total monthly rate of the employee will be charged against the activities in which he is engaged. The activity costs should include all contributed time.

a. Supervision. Include general overhead, ware-house man, camp manager not actually engaged in treating or spotting.

b. Travel. Travel expenses paid to and from the job, and salaries of men on travel status.

c. Transportation. All expense of pack strings, including forage, shoeing, wages of packer, horse hire. All truck and wagon hire, including drivers. Freight and express.

d. Equipment. This item will not agree with the cost of equipment purchased. Include any

rental charge made by Central Purchase for equipment such as blankets and cooking outfits from fire stores, and for all other equipment used a depreciation charge on the original value of one-third.

e. Camps. Labor and salary cost of setting up and breaking camps, bull cook and wood cost. No transportation included.

f. Spotting. Labor and salary cost of spotting, including crew foreman.

g. Treating. Labor and salary cost of treating, including crew foreman. Cost of horses used on the job of packing oil and tools or skidding. Cost of oil (oil may be kept separate if desired).

4. Output

Spotting. Number of trees per effective man-day 10.2

Number of acres per effective man-day 44.5

Treating. Number of trees per effective man-day 9.-

Summary Man Days

	Forest Officers	Temp.	Total
Supervision	367.0	8.5	375.50
Spotting	101.0	479.0	580.00
Treating	190.0	464.0	654.00
Camps	104.0	205.0	309.00
Travel	25.0	59.0	84.00
Transportation	24.0	339.0	363.00
Lost Time (Non-effective)	158.0	90.0	228.00
Cooks and Flunkies		246.5	246.50
Totals	949.0	1891.0	2840.00
Total Effective Days	811	1801	2612

Notes:

Subsistence cost per man-day is figured against total man-days.

Spotting and treating each figured against the effective man-days involved in each, as shown in above tabulation.

SUMMARY

Trees and Acreages Spotted and Treated by Units and Drainages

Drainage	Trees Spotted L.P.P.	Trees Spotted W.B.P.	Trees Treated L.P.P.	Trees Treated W.B.P.	Acres Spotted L.P.P.	Acres Spotted W.B.P.	Acres Treated L.P.P.	Acres Treated W.B.P.	Ave. Trees per Acre Treated	Area Covered Advance Survey
SHEEP CREEK CANYON UNIT										
Sheep Cr.	1,952	350	1,952	341	3,660	300	1,545	100	1.8	
W. Fk. Sheep	752		752		800		700		1.0	
Totals	2,704	350	2,704	341	4,460	300	2,245	100	1.28	
Total Both Species	3,054		3,045		4,760		2,345		1.28	
260 L.P.P. cut and burned										
BLACKTAIL UNIT										
Upper W. Fork	70	288	70	288	1,720	1,380	900	800	.21	1320
Clover Cr.	151	76	151	76	320	290	320	290	.37	
Wolverines		64		64	95	135	95	135	.28	acres in these four drain-ages
West & Middle Creek	300	70	300	70	2,245	2,700	1,315	1,850	.11	
Lower W. Fork & Basin Creek	249	137	249	137	980	980	1,485	1,485	.13	280
East Fork	31	176	31	176	115	710	115	530		6,090
W. Fk. Ruby & Timber Cr.	Trees treated included in E. Fork above.				330	515	230	515	.13	1,155
Middle Fork	48	146	48	146	830		830		.23	
Totals	849	957	849	957	6,635	6,710	5,290	5,605	1.46	8,845
Totals Both Species	1,806		1,806		13,345		10,895		1.46	
283 L.P.P. & W.B.P. cut and burned.										
WEST FORK MADISON UNIT										
Lobo & Portal		80		80		1,380		1,380	.05	
Cascade Cr.	100	137	100	137	70	270	70	270	.70	
Meridian Cr.	280		280		640		24		8.6	300
Upper W. Fork and Tributaries	No Infestation Found									2,000
Totals	380	217	380	217	710	1,650	94	1,650	2.91	2,600
Totals Both Species	597		597-All T.S.		2,360		1,744		2.91	
All burned standing.										
RUBY UNIT										
Idaho Cr.	139		139		Combined Drainages					
Dark Hollow	226		226		4,830		1,145		.32	2,000
Warm Springs	68		37		530		100		.37	
Totals	433		402		5,360		1,245		.69	2,000
All treated standing.										
SWEETWATER HILLS										
Carter Cr.	32		22		5		5		4.+	480
Project Totals	4,398	1,524	4,357	1,515	17,170	8,660	8,879	7,355	.36	13,925
Totals Both Species	5,920		5,872		25,830		16,234		.36	

Area covered advance survey by crew 10,000
Area covered advance scouting by F.O.S 13,925
Total area covered 49,755

Total trees cut and burned -- 543

SHEEP CANYON UNIT.

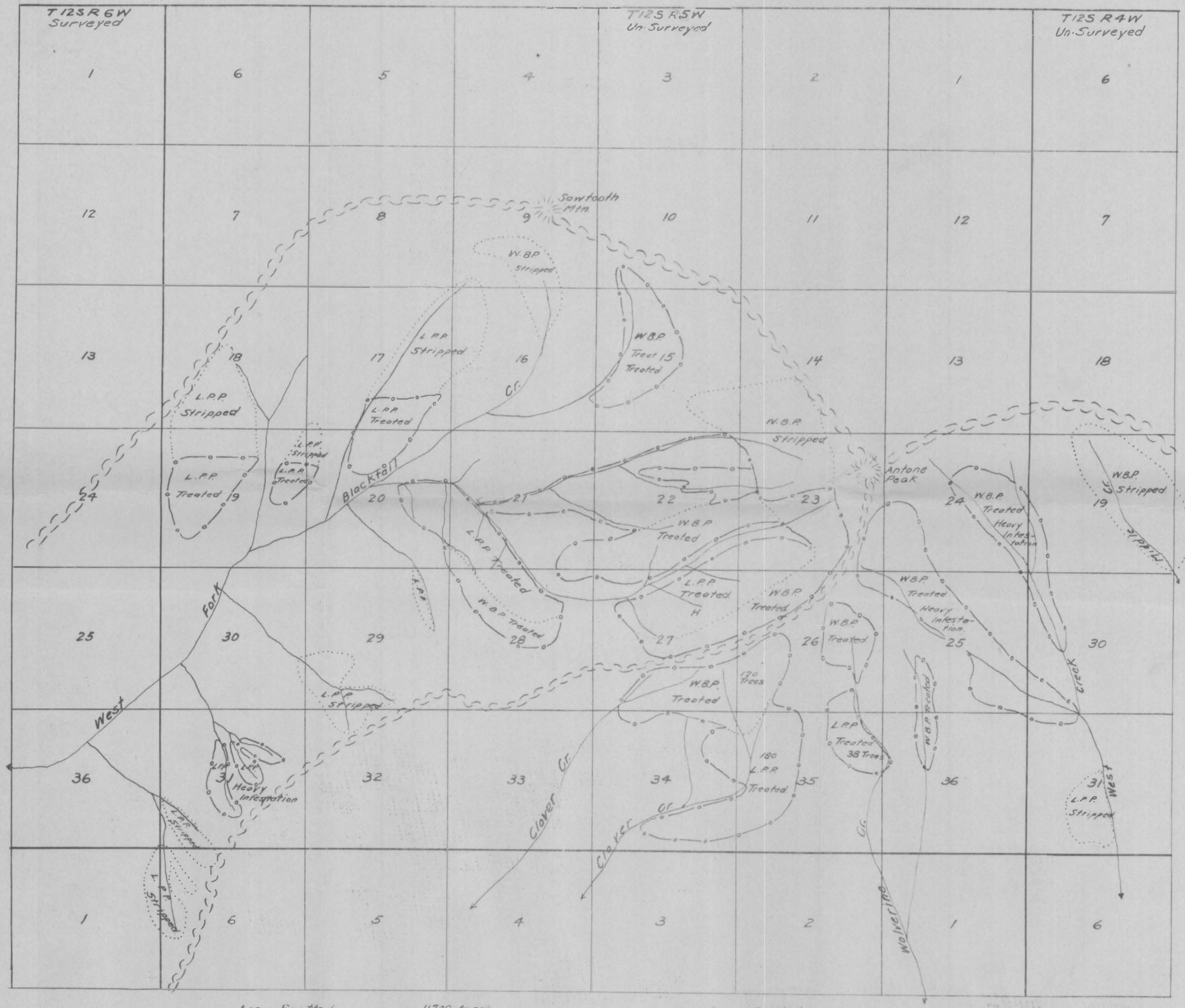
Area Spotted 4766 Acres.
Area Treated 2345 "
Area Spotted ----
Area Treated —o—o—

T 9 S R 9 W
T 10 S R 9 W
T 9 S R 8 W
T 10 S R 8 W

Training Camp
L.P.P. Heavy
L.P.P. Heavy
L.P.P. 70 Trees
L.P.P. in large Patches Heavy infestation Approx. 380 Trees
Talent Camp.
Rye Patch Camp.
L.P.P.
L.P.P.
L.P.P.
L.P.P.
L.P.P.
L.P.P. Large groups
L.P.P.
L.P.P.
Meine Camp
L.P.P. 17 Trees
L.P.P.
L.P.P.
L.P.P.
L.P.P. 152 Trees
L.P.P.
Howarth Camp
L.P.P. + Mixed 200 Trees

BLACKTAIL UNIT

UPPER BLACKTAIL - CLOVER CR.
WOLVERINE AND MIDDLE CR.



Area Spotted	4700 Acres
Area Treated	3380 "
Area Advance Survey.	1320 "
Mapped by H.R. Lorsen	6/31.

Area Spotted - - - - -
Area Treated —o—
Type Lines .....
Traced by G.M. De Jornette 9/31.

BLACKTAIL UNIT

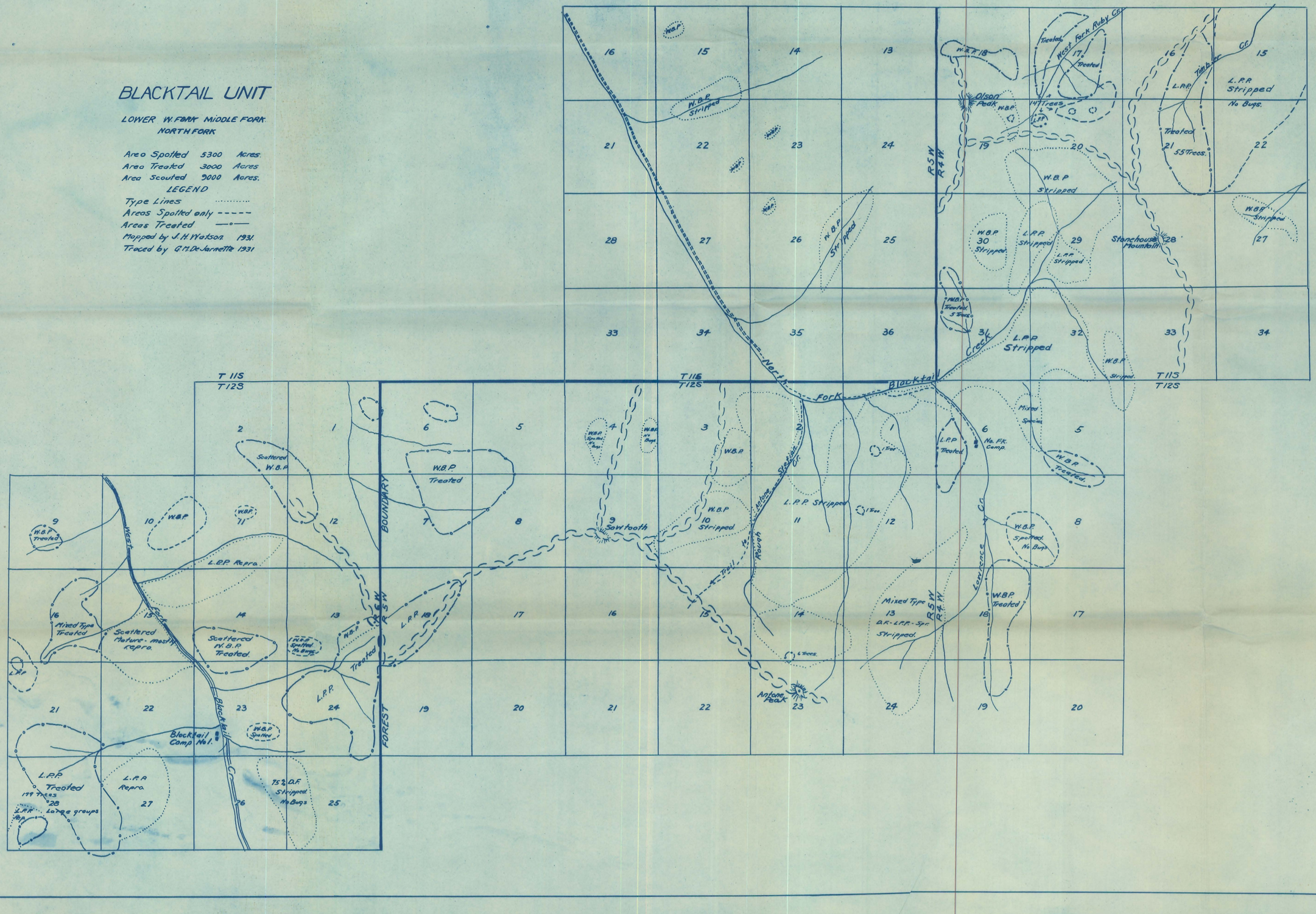
LOWER W. FORK MIDDLE FORK NORTH FORK

Area Spotted 5300 Acres
Area Treated 3000 Acres
Area Scouted 9000 Acres.

LEGEND

Type Lines .....
Areas Spotted only -----
Areas Treated —o—

Mapped by J. H. Watson 1931.
Traced by G. M. DeJarnette 1931



NATIONAL FOREST BOUNDARY

Barton Cr.

Susceptible Timber

Scouted in Advance Survey.

No Bugs

BOUNDARY

22 23 24 19 20 21

L.P.P. Treated

27 26 25 30 29 28

Spotted

Idaho Cr. Camp.

No Bugs

Non Susceptible

L.P.P. Pole Stand

Idaho Cr.

34 35 36 31 32 33

Treated L.P.P.

Treated L.P.P.

Non Susceptible

Jasmine Cr.

Treated L.P.P.

3 2 6 5 4

Susceptible Timber

Scouted

No Bugs

FOREST

Hollow

Spotted

No Bugs

L.P.P. Treated

10 11 12 7 8 9

L.P.P. Treated

Treated

Treated

15 14 13 18 17 16

Dark

NATIONAL

22 23 24

Greenhorn Camp

IDAHO CREEK UNIT.

Area Spotted 5800 Acres

Area Treated 1060 "

Area Scouted 2000 "

LEGEND

Area Spotted - - - - -

Area Treated —o—o—

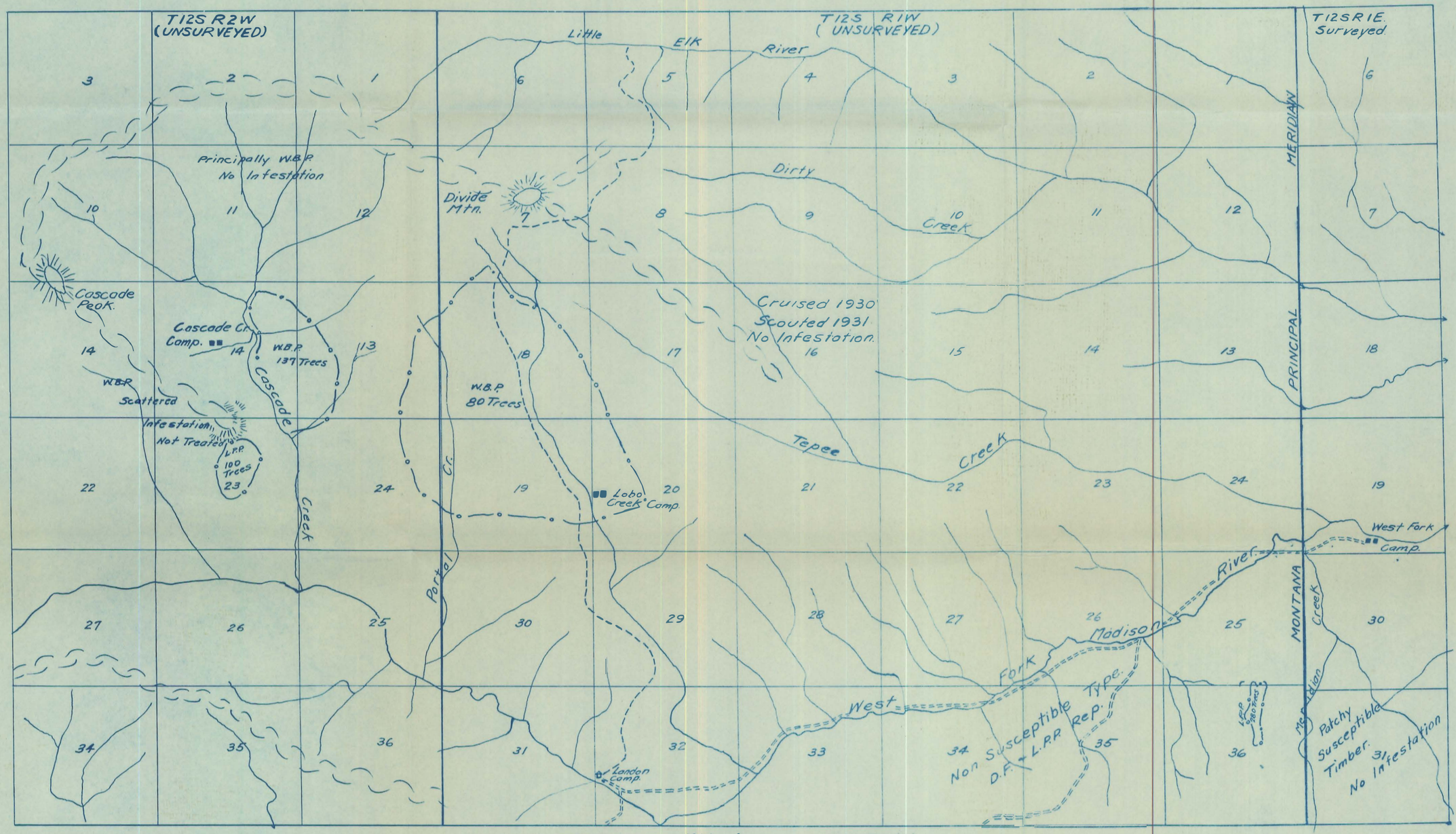
Type Line .....

Mapped by C.A. Bloom 1931.

Traced by G.M. DeJarnette 7/31.

WEST FORK MADISON UNIT

CASCADE, LOBO, PORTAL AND MERIDIAN CREEKS



Area Spotted 1900 Acres
Area Treated 1900 Acres
Area Advance Survey 23,000 Acres

Area Treated —o—

Mapped by G. M. DeJonnette
7/31

Madison Insect
Control Report (8)

2 copies kept by
Mr. DeJarnette
(1 for himself
(1 " Mr. Carroll

1 Copy sent Forester

2 sent to Mr. Snedden

1 " Bearshead

2 file copies